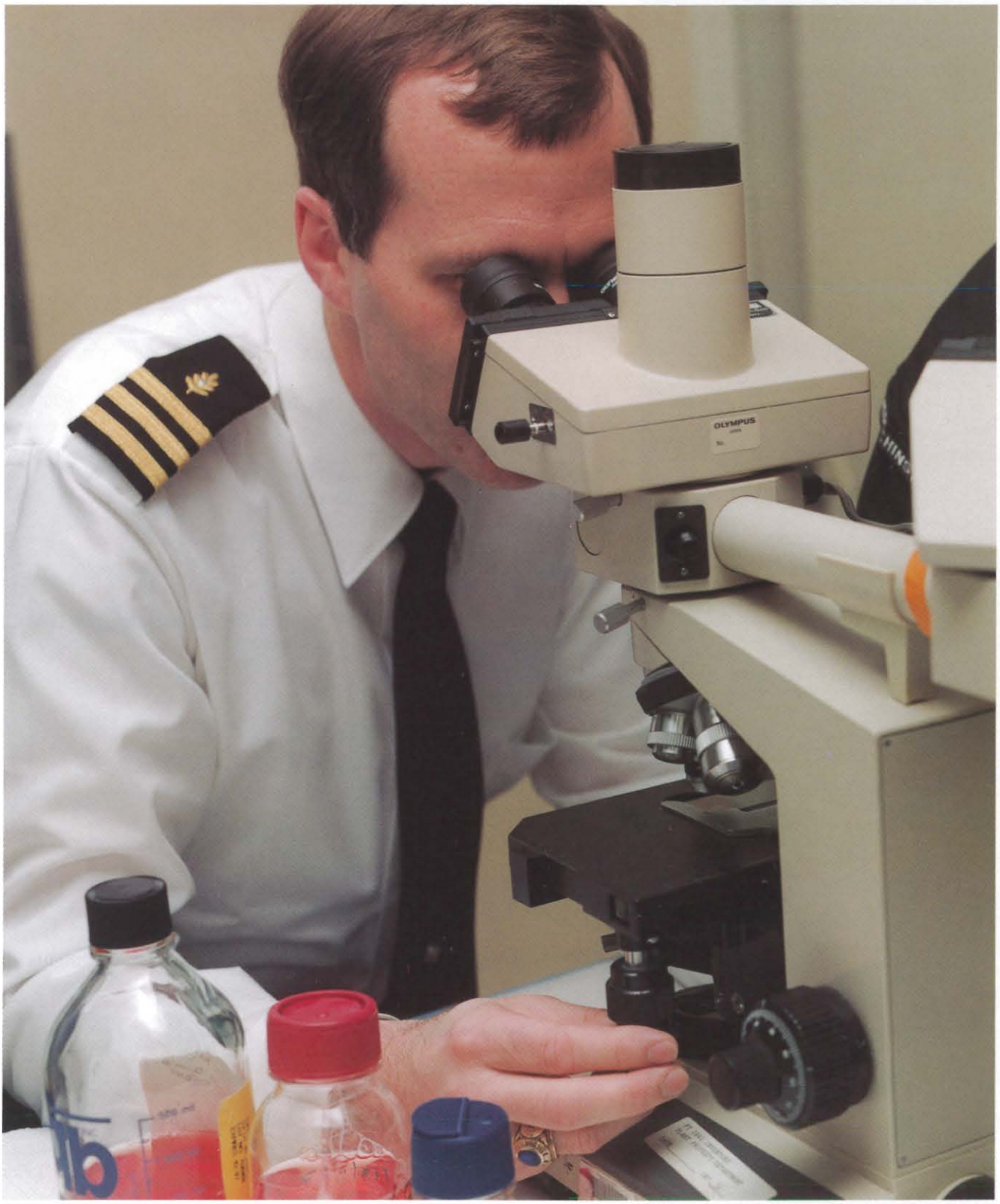
NAVY MEDICINE

March-April 1997



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COVER: CDR David M. Harlan, MC, examines expression of the costimulatory ligand B7 in pancreatic tissue sections. Story about the Naval Medical Research Institute's Immune Cell Biology Program on page 19. Photo by HM3 JaSon E. Wright, NSHS Bethesda, MD.

Corpsman Renders Aid to Gunshot Victim

Some say we all have a guardian angel, and for one wayward Washington, DC, teenager, he found his guardian angel in HM2 Victor C. Chavis. It was fate that brought the two together, and undoubtedly a day neither will forget.

"I was driving toward the Pentagon and saw a van speed past me," Chavis recalls. "I saw the driver was a teenager who had gotten himself into trouble because he was being chased by some police cars."

A few seconds later, Chavis was forced to stop his vehicle at a police roadblock. Unbeknownst to him, Defense Protective Service officers from the Pentagon had been in pursuit of five teenagers for stealing a minivan from the Pentagon parking lot. Three of the suspects were apprehended and were sitting right there in front of Chavis. The other two had passed him a few seconds earlier in the speeding van. When he noticed one of the youths lying on the ground with blood in front of him, he automatically did what he has been trained to do in the Navy—save lives.

"I saw an injured teenager who was bleeding and needed help, but there was no ambulance," explained the 11-year Navy veteran who grew up in Brooklyn, NY.

HM2 Victor C. Chavis

Without hesitation, Chavis approached the police officers to see if they needed assistance. When they noticed the emblem of the medical profession on his sleeve, they asked if he could render aid to the injured youth. Years of medical training in the Navy and as a hospital corpsman serving with the Fleet Marine Force enabled Chavis to assess the situation immediately. When he knelt down to assist, he heard the victim say, "Help me. Please help me."

I was surprised to find him fully alert because he had lost a lot of blood," said Chavis. "It didn't matter to me what he had done to get himself into this situation. I just saw a kid and he was begging for help."

The handcuffed 15-year-old had multiple gunshot wounds. He had been shot twice in the neck, once in the chest, and also had sustained a head wound. "I've seen a lot of car accident victims, and I've had to help patch them up, but this is the first time I've worked on a gunshot victim," said Chavis.

The corpsman stopped the bleeding and continued to render first aid for about 15 minutes before paramedics arrived and transferred the youth to a local hospital.

"I was glad that I was trained and able to help," said Chavis. One of the paramedics on the scene mentioned that the teenager was lucky to have Chavis there to help. But it was more than luck. It was destiny. ❑

—Story by LT Edie Rosenthal, Public Affairs Office, Bureau of Medicine and Surgery, Washington, DC.

Atlanta Medical Reservists Help Host the World

Forty-four naval reservists from Naval Hospital Jacksonville, FL, Detachment 408 were afforded a unique Annual Training (AT) opportunity this year. They performed their 2 weeks of active duty in the heart of Atlanta, GA, providing medical support for athletic venues at the 1996 Paralympic Games.

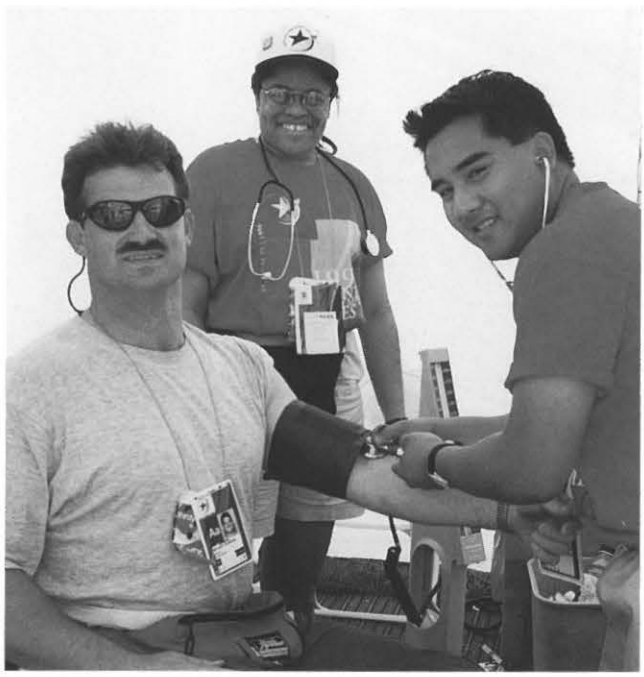
The Atlanta Paralympics were the world's second largest sporting event in 1996, the 10th Paralympic Games ever held, and the first in the United States. Atlanta hosted 120 nations participating in 26 sports and related activities. This effort entailed accommodating 3,500 athletes, 1,000 coaches and team staff members, 1,500 officials, innumerable media representatives and technical personnel, 1,800 Paralympic family members, and 12,000 volunteers during the 10 days of competition from 15 to 25 Aug 1996.

As this was a rather unparalleled AT opportunity, the unit's efforts required hundreds of hours of personal as well as Reserve drill time in advance planning. The hospital unit's administrative team coordinated the early preparations with representatives from the Atlanta Paralympic Organizing Committee (APOC) and the Department of Defense Office of Special Events. Preparations included over 1,700 hours of combined training time (involving ACLS certification for all participating nurses, BLS and first aid training for corpsmen, and disability research and review education for all staff), and over 1,000 hours of nondrill time spent on scheduling, phone communications, and troubleshooting. In addition to this extensive advance training, the unit contributed a total of 519 AT days during the Games themselves.

Upon reporting for AT, but prior to the actual start of competition, several corpsmen worked closely with Paralympic "classifiers," helping them examine athletes and determine how they were assigned to the various competitive groups. Participants in Paralympic athletics are separated into five major categories: blind and visually impaired, cerebral palsy, amputee, wheelchair (paraplegic/quadriplegic), and mental handicap. Within these categories are subcategories known as classes. For those with visual impairment, the class is based on the athlete's ability to see. Cerebral palsy and wheelchair classes depend on degree of ability, and amputees are placed in classes depending on location and degree of amputation(s). The classification system can be very complex. For example, in the amputee category alone there are 12 subcategories or classes. Placement is very important to the athletes, and the placement procedures were detailed and involved. The corpsmen who assisted in this area met many athletes and got a chance to perform some real "hands on" care. Many of the athletes and their staff seemed delighted with the military presence and expressed their gratitude for the assistance.

After completing classification of the athletes, the unit moved on to the actual athletic competition stage. The unit had been asked by the APOC Medical Director, Dr. Robert Wells, to assign personnel to several venues. Nurses, corpsmen, and MSC officers were assigned to the Polyclinic located at the Georgia Tech campus, site of the Paralympic Village, where the athletes resided. The Polyclinic was not a competition venue, but was an urgent care facility open 24 hours a day over the 16 days the Paralympic Village was open. At this location, reservists had the opportunity to take care of athletes, coaches, team dignitaries, and families of athletes. Services available at the Polyclinic included physician exam, triage, lab, radiology, and on-site pharmacy. Along with the Paralympic community, Georgia Tech students also continued to be seen at this location. LCDR Beryse Jones, an MSC lab officer, spent some off-duty hours learning how to operate the clinic's lab machinery and provided the clinic with her ability to perform on-site malarial testing. LCDR Jones' expertise proved to be extremely cost-effective, saving the expenses involved in off-site laboratory analysis.

In addition to the Polyclinic location, medical services were needed at the many athletic competition sites spread around the Atlanta metropolitan area. Nurse Corps officers were assigned to spectator and athlete care first aid stations at the Aquatic Center (swimming venue), the Olympic Stadium (track and field), Alexander Memorial Coliseum (standing volleyball), and an International Zone first aid tent in the Paralympic Village. Coverage of the Paralympic opening and closing ceremonies required expansion of medical care sites for the Olympic Stadium venue to include first aid stations at the adjacent Fulton County Stadium. Over 6,000 people were involved in field activities for both ceremonies. Participants were "staged" at Fulton County Stadium (home of the Atlanta Braves) and then, "on cue," were sent across the street to the Olympic Stadium. Nighttime movement of such a large number of people obviated the need for additional medical support. Many of the participants were ambulatory, but those in wheelchairs or with visual impairment needed some additional assistance.



LCDR Charlene Wicks and HM3 Benjamin Mangawang check the blood pressure of South African Paralympian Michael Louwrens, 36, who holds the world records for his class of wheelchair athlete in the shotput and discus. In deference to the heat and humidity, medical personnel at the first aid stations wore the shorts and T-shirts of Paralympic volunteers, while those at the clinic wore their Navy uniforms.

All the medical aid sites saw a wide variety of patients, with needs ranging from care for minor injuries such as abrasions, blisters, and bee stings to major problems like chest pain, seizures, fractures, open wounds, and autonomic dysreflexia. Open wounds encountered were varied: punctures and tears from cleats on the field of play, abrasions from road-burn bike accidents, and many others. Exposure to heat provides a unique challenge for athletes with disabilities. These problems are due to decrease in sensory distributions, sympathetic nervous system dysfunction, and a deficient body mechanism for warming or cooling among the disabled. This problem typically affects the spinal cord-injured athlete. Quadriplegics and those with a spinal cord lesion above T-1 are especially vulnerable to heat stress, as they do not sweat (diaphorese) below the level of the spinal cord injury. Thus there is no effective mechanism for body cooling. These concerns were heightened by the intense Atlanta heat, with daytime temperatures regularly topping 90 degrees F. With this in mind, the reservists received special training in evaluating and managing heat-related health problems. The athletes were not the only ones who suffered from the heat, however, as safety concerns required modification of the usual Navy uniform to the shorts and cotton shirts of the Paralympic uniform for unit members working outdoors.

As the unit had to provide medical support at numerous Paralympic venues and cover several shifts at each, scheduling of personnel proved to be one of the greatest challenges. CDR Melissa Toler and CAPT Joe Latham had the unenviable task of keeping the schedules and dealing with the constant changes in plans. The Navy medical community's hallmark of flexibility became apparent over and over again, as they dealt constantly with changing needs for medical services. Adding to the challenges faced by the reservists was the international flavor of the Games. Many times, language barriers had to be dealt with to treat athletes. Interpreters were called in when and where available. Otherwise, hand signals and gestures had to be used and were very effective most of the time. Despite the unusual challenges, unit members demonstrated exceptional competency as they handled a full range of emergencies and other patient care with skill and expertise at the medical aid sites.

In addition to the clinical work, the reservists were able to share knowledge with some of their civilian colleagues.

Unit members worked with a wide range of volunteers who had come to Atlanta from all over the country. MDs, physical therapists, massage therapists, athletic trainers, nurses, paramedics, and EMTs were just some of the medical specialists needed to staff an international event of this magnitude. Connie Whittington, an RN who was the Olympic Stadium Medical Administrator, commented how glad she was to have Navy nurses among the many exceptional volunteers assigned to her venues. She mentioned, as her reasons, their exemplary performance, dependability, and, of course, flexibility in dealing with an ever-changing situation.

One unanticipated positive outcome of the unit's participation were the ample recruiting possibilities. Many people were curious about the Naval Reserve and eagerly asked questions of the reservists regarding various aspects of service. Reservists were enthusiastically welcomed everywhere by spectators, athletes, and other volunteers.

LCDR Robyn Elsner with Trisha Zorn, a visually impaired athlete who won a Paralympic gold medal in swimming for the United States.

At the end of AT, members of the Naval Hospital Jacksonville unit participated in an after-action discussion, invariably relating their excitement at meeting and helping such a broad spectrum of athletes and staff from all over the world. The general consensus was that this was the best AT unit members had ever participated in, personally as well as professionally. Positive comments and uplifting stories abounded. Without fail, unit members stated their new understanding of the entire Paralympic movement and heightened "disability awareness." Initial reaction for many in the unit had been sadness and shock at the range of physical disabilities and the implied limitations of such. All unit members reported a change in attitude to pure admiration for what these athletes accomplish, and how well they do it. Many athletes turned in achievements rivaling those set just a few weeks earlier during the Olympic Games. The Paralympic slogan, "The Triumph of the Human Spirit," took on a whole new meaning for the unit. One health care provider, HM1 Wayne Carlisle later said that "The camaraderie among the naval and civilian personnel at all venues was wonderful. It was an excellent learning experience." CDR Sally Comer recalled, "I worked most of my shifts from 3:00 p.m. to 11:00 p.m. at the Polyclinic. I especially remember one athlete from Kazakhstan, a quadriplegic who spoke no English. He was a coach. He needed medical care for an infected elbow wound. We communicated via hand signals and with a little help from others learned part of his story. He was very poor, with no family, and had nothing at all to return to in his country. His plight was very touching. To be able to help him, and others like him, is something I am grateful for. I met people from different countries every night I worked. It was a thrilling 2 weeks." LT Lynn Nicolai's favorite moments "were seeing Tony Volpentest run. He runs on two artificial feet and has no hands. He gold-medaled in both the 100 and 200 meter dash and his Paralympic record-setting times were only 1.5 seconds off Olympic times set earlier in the month."

The mission statement for the 1996 Atlanta Paralympic Games was to conduct the most successful games and to leave a legacy for the Paralympic movement. The medical mission was to provide comprehensive medical care and to expand the understanding of the health care community of the skills and needs of people with disabilities. The reservists of Naval Hospital Jacksonville Detachment 408 are proud to say that both missions were accomplished. ❑

—Story by CDR Melissa Toler, LCDR Lynn Nicolai, and LCDR Kent Davis, Naval Hospital Jacksonville, FL, Detachment 408. Photos by LCDR Kent Davis.

Hospital Corps Rating Badges

HMCS (FMF) Mark T. Hacala, USNR

Hospital Corpsmen and their predecessors have worn a variety of insignia to denote their specialty throughout the Navy's history. With the development of the enlisted uniform, increase in the size of the Navy, and the growing role of the enlisted person in Navy medicine came new ways to recognize the shipmate who worked in sick bay.

Petty Officer: 1841-1886

Navy enlisted rate insignia did not exist until well into the 19th century. Loblolly Boys, the early assistants to ship's surgeons, could only be identified as health care personnel by their work stations. Surgeon's Steward, the initial petty officer billet in the Medical Department, was created as a specific title in 1841. That same year, uniform regulations introduced the first rate badge for U.S. Navy petty officers.

This sleeve patch consisted of an eagle, wings open with feather tips down, perched atop a foul anchor (note the correct expression, as opposed to the erroneous "fouled anchor"). Although it was used to identify petty officers of all ratings, the badge was worn on the right arm by seaman branch petty officers and on the left arm by all others. Besides the patch's placement on the left arm, there was no way to distinguish the Surgeon's Steward from any other nondeck petty officer.

In 1852 the rate badge included a five-point star, single point down, over the eagle and foul anchor. The appearance of this rate badge was modified so that the eagle's wings were extended, feather points out, in 1866. With this post-Civil War change to the enlisted uniform, eight specialty marks, worn separately from the rate badge, were created. The combination of rate badge and specialty marks could identify up to 13 different ratings.

Rate and Rating: 1886-1898

Insignia for three grades of petty officers, third, second, and first class, were established in the Uniform Regulations of 1886. In this system, the specialty and grade were depicted in one rating badge for the first time. The petty officer first class was the top enlisted rate under the 1886 regulations, and it was the first class who wore the senior enlisted uniform: a sack coat, shirt and tie, and visor cap. It is worth noting that this coat and tie uniform, soon to be that of the chief petty officer (CPO), did not exist for officers until after World War I. It was, therefore, the officer community which adopted the CPO uniform, not vice versa as commonly believed.

The first class petty officer badge consisted of a spread eagle, a diamond, specialty mark, and three chevrons. Its thick chevron, point down, was divided into three by rows of stitching. A lozenge or diamond superimposed with the specialty mark was placed in the angle above the chevrons. Second classes wore the same badge with three chevrons and no diamond, and third class petty officers wore the badge with two chevrons. Chevrons were scarlet on both blue and white backgrounds, unless the petty officer had three consecutive good conduct awards, in which case the chevrons were to be gold. The eagle, looking to its left, was embroidered in blue thread on the white rating badge and in white on the blue badge. It was worn on either the right or left sleeve, the arm determined by the wearer's watch section—port or starboard.

Only one rate of medical petty officer existed under the 1886 system. The Apothecary, who rated with a first class, wore that rating badge with

a caduceus for the specialty mark. There was no specialty mark for the Bayman, the nonrated medical assistant.

Master-at-arms, commonly known as "Jimmy Legs" in the Navy of that day, was the senior petty officer aboard ship, and that rating's first class badge included three arcs or "rockers" connected to the tops of the chevrons. When the rate of chief petty officer was created in 1893, new chiefs were given the master-at-arms rate badge, three chevrons and three arcs, with their own ratings' insignia. Apothecaries were now rated as CPOs and wore the new rating badge.

A new style of rating badge was described verbally in 1894, although the design was not pictured until the 1897 Uniform Regulations. In this style, individual chevrons were sewn to the patch: one for third class, two for second, three for first, and an arc added for CPO. A new eagle, whose wings were raised upward, was adopted. Its body was upright and its head looked into its left shoulder. In essence, it was the same design of rating badge used today. Through the Spanish American War, Apothecaries would wear this type of rating badge with the caduceus as their rating identifier.

Medical Symbols: Caduceus vs. Red Cross

The caduceus antedated the red Geneva cross as the enlisted Navy medical insignia. U.S. military forces had used both devices to identify their medical personnel through the 19th and into the 20th centuries. Navy surgeons used the caduceus for a brief period in the 1840's. Army senior enlisted medical personnel called Hospital Stewards (a term later borrowed by the Navy), were identified by a caduceus beginning in 1858. The Army later used crosses, first the splayed or Maltese cross then the Geneva cross, as enlisted medical insignia.

Debate arose over the years as to the appropriateness of the caduceus—the winged staff entwined by two snakes—as a Medical Department symbol. The caduceus was the mythological implement of Hermes or Mercury, the god of commerce and the messenger of the pantheon. It was argued by some that the wingless, single-snaked staff of Aesculapius, the god of healing, was the correct medical logo and that use of the caduceus arose from a faulty knowledge of classical mythology. A proposal for the Army's adoption of the caduceus was made in 1902 by a doctor, COL J. Van Rensselaer Hoff, who noted that the caduceus had been used in previous centuries to identify merchant ships as noncombatants. Because most of the people in the Medical Department were noncombatants but also nonmedical, he argued, the winged staff was more appropriate. While a compelling case, Hoff's argument shed no light on the rationale for earlier use of the caduceus in American military medicine.

Arguments in favor of the Geneva cross covered both the noncombatant and medical issues as well. Opponents said that it should not be used because it was a Swiss national symbol. Advocates, though, noted that neutral Geneva was the site of international talks on the rules of warfare, which recognized the noncombatant status of medical personnel. Further precedent for the use of a cross as a medical symbol was drawn from various groups of medieval knights. The Hospitaller Order of St. John of Jerusalem had devoted themselves to the care of the sick and injured, and had identified themselves with what is now known as the Maltese cross, the arms of which were like four arrowheads pointing toward the center. The cross, then, was not preferred as an intrinsically national or Christian symbol, but as a sign of healing and nonaggression.

Hospital Corps: 1898-1916

Preferences for both the caduceus and the cross were doubtless expressed in Navy circles near the end of the 19th century. With the establishment of the Hospital Corps in 1898, arguments for the red cross won and that became the corps' rating identifier. Hospital Steward, now the equivalent of a CPO, replaced Apothecary as the senior medical rate. Hospital Stewards wore the new chief's insignia with the new red cross between the upper chevron and the arc.

There were no medical equivalents to first or second class petty officer at this time. The Hospital Apprentice First Class was not a petty officer per se, but rated with a third class petty officer and wore a PO3 rating badge and red cross. The only other enlisted medical grade was Hospital Apprentice, a nonrate who wore the red cross on the right or left upper sleeve and two rows of white piping on the cuff of the jumper. Cuff stripes would be used to identify those below petty officer grade until World War II, when they were standardized to three.

Minor changes to the rating badge were made in 1905. A tightly-bound stitch at the outside of the wool felt chevron secured it to the backing material. The eagle was made to look more natural in its stance with its body angled to the right on its perch. The feather tips of its wings were asymmetrical and its head was now raised to look over its left shoulder.

Rating badges and the Hospital Apprentice mark continued to be worn on the sleeve corresponding to the wearer's watch section until 1913. At that time insignia placement reverted

to the 1841-1886 scheme in which deck ratings wore their badges on the right sleeve and all others, including medical personnel, wore them on the left. The eagle continued to look to its left regardless of specialty or arm placement, but it was now to be embroidered in silver bullion on gold-chevron rating badges and on all CPO rating badges. Rating badges for white uniforms after this date were to be made with blue chevrons instead of red.

Pharmacist's Mate: 1916-1948

1916 Uniform Regulation changes reflected a new enlisted medical rate structure. All grades of petty officer—third, second, first class, and chief—were now represented and the Hospital Corps rating was given the title of Pharmacist's Mate. Continuing to use the red cross, these rates wore the eagle, chevrons, and "rocker" identical to those on today's chief and petty officer badges. The Hospital Apprentice First Class wore a lone red cross, and had three rows of piping on the cuff of the dress uniform. The Hospital Apprentice Second Class used the cross and two rows of piping.

The next major change in the rating badge came as America prepared for World War II. Uniform Regulations of 31 May 1941 stated that the eagle's head would look forward (toward the enemy, some noted) whether the rating badge was worn on the right or left arm. To accommodate this change, the eagle's body became more stylized, symmetrical, and vertical on its perch. A khaki service dress uniform, similar in cut to the aviation working green uniform that has survived to the present, was in use for CPOs at the start of the war. In 1943 it was replaced by an identically-cut slate gray uniform which lasted until 1948 (1949 for the Naval Reserve) when the khaki uniform returned. CPO rating badges were made in khaki, green, and gray to match these uniforms.

World War II would also bring about new insignia for women, who originally wore the same rating badges as men. Smaller-sized petty officer rating badges for the different female uniforms were introduced in 1943. Women below the grade of petty officer third class did not wear jumper uniforms so their grades could not be identified by the number of cuff stripes. Nonrate insignia for the upper sleeve, consisting of two or three diagonal stripes and a rating device, were created for women in 1944.

Hospital Corpsmen: 1948-Present

Significant uniform changes were instituted following the war. Enlisted personnel of all ratings were now to wear their rate insignia on the left arm, and the petty officer eagle was standardized to look to its right for all ratings. In 1948 corpsmen were renamed Hospital Recruit, Hospital Apprentice, Hospitalman, Hospital Corpsman Third, Second, and First Class, and Chief Hospital Corpsman. The women's nonrate badges of 1944 were adopted as "group rate marks" for E-1 through E-3 personnel of both sexes in 1948 as well. Junior grades of corpsmen would now use the caduceus with their stripes. Hospital recruits wore the single stripe until 1975 when E-1 insignia was abolished. Rate badges, showing only the eagle and chevrons with no specialty mark, were created for the chambray shirt (1956) and the blue working jacket (1957).

With the 1948 uniform and title changes came the return of the caduceus as the rating device. Use of the caduceus was extended to the newly separated Dental Technician rating, which was distinguished by a "D" superimposed over the staff and serpents. The reintroduction of the caduceus may have been prompted more by a desire to make all rating insignia the same color than to recognize the correctness of one symbol over another. Although the caduceus came to symbolize enlisted medical personnel again, a variety of Navy medical equipment and spaces continue to be marked with the red cross.

The rates of Senior Chief Petty Officer and Master Chief Petty Officer were created in 1958, adding one and two stars, respectively, to the CPO badge. Master Chief Petty Officer of the Navy was established in 1968, adding a third star above the eagle. Command Master Chief Petty Officer and Fleet/Force Master Chief Petty Officer positions were created, with some waffling over the exact titles, in 1972 and 1975. When assigned to fleet or force MCPO billets, a corpsman replaces the caduceus with a star.

Silver bullion's high cost led to the authorized use of pseudometallic thread for the embroidery of the eagle, rating device, and gold chevrons in more recent years. A less aesthetically-pleasing petty officer eagle supplanted the 1941 eagle in the mid-1980's, even though Navy Uniform Regulations to this day have continued to show the older variety. Frequent derogatory comments on the bird in current production compare it more to a parrot than an eagle.

Corpsmen With the Marines

Insignia for Hospital Corpsmen serving with the Marines deserves mention. Rating badges on a green or khaki backing with a green embroidered eagle were made for these "Grunt Corpsmen" as early as World War I. Through World War II, the chevrons for these rating badges were often made in the same style as Marine Corps chevrons—green on a red backing—and then sewn onto the

Author's collection

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1. Petty Officer, 1866-1886. This generic rate identifier was used by all Navy petty officers. Nondeck department petty officers, including the Apothecary, wore it on the left arm. The eagle & anchor badge was established in 1841, its star added in 1852, and the eagle's wings changed in this version.

2. Apothecary, 1886-1897. This was the first style of rating badge to include both grade and specialty. The eagle, chevrons, and lozenge were used by all first class petty officers until the 1890's. Note the use of the caduceus as a rating mark, which predated the red cross by more than 20 years.

3. Hospital Steward, 1905-1913. The more natural representation of the eagle, with its asymmetrical wings and angled body, was used until 1941. Post-1913 CPO rating badge eagles were embroidered in silver bullion. It would have been worn on the sleeve corresponding to the wearer's watch section: left for port section, right for starboard. After 1913 the red chevrons were changed to blue chevrons on this summer rating badge.

4. Hospital Steward, 1905-1913. Red chevrons on this white rating badge establish its date. It would have been worn on the sleeve corresponding to the wearer's watch section: left for port section, right for starboard.

5. Pharmacist's Mate, Second Class, 1913-1941. Chevrons on rating badges of this period were made of good wool felt and bound with a tight stitch. Later

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period chevrons were made of cotton on summer rating badges.

6. Pharmacist's Mate, Second Class, 1918(?)-1945. Rating badges for Marine Corps service uniforms often used red-bordered chevrons which were then affixed to the patch.

7. Pharmacist's Mate, Second Class, 1945. The eagle's head, looking to its right, could indicate that this was the right-arm crow of a pair used on the Marine summer uniform.

8. Pharmacist's Mate, First Class, 1943-1948. Smaller rating badges were made for female uniforms starting in World War II. This insignia was for the women's summer seersucker uniform.

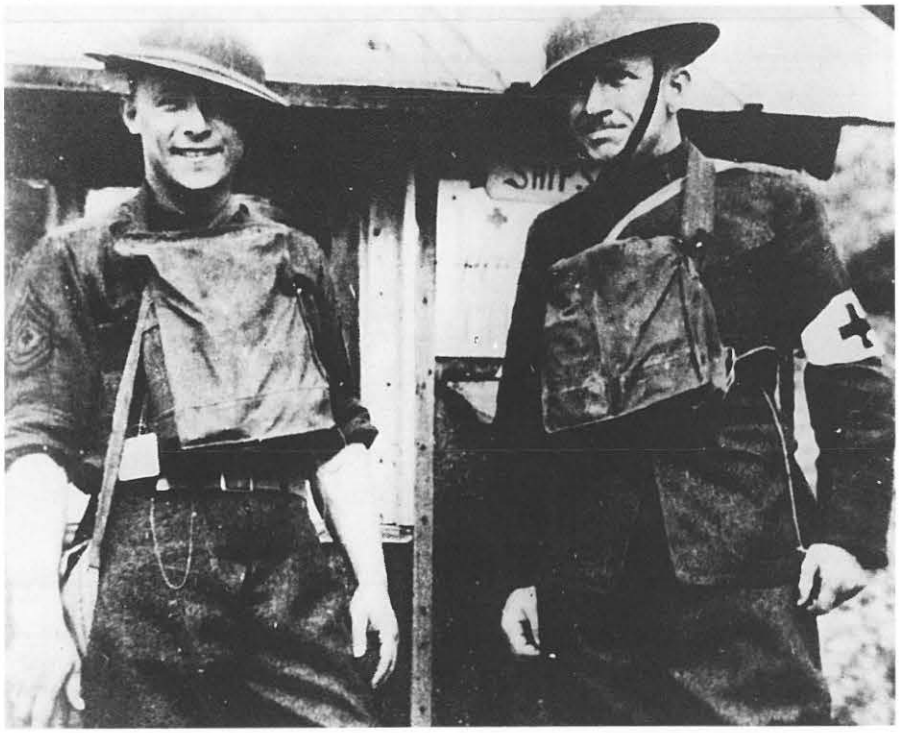
9. Chief Pharmacist's Mate, 1943-1948. Smaller rating badges were made for female uniforms in late World War II. This insignia was for the women's summer uniform.

10. Chief Pharmacist's Mate, 1941-1948. This rating badge was used on the World War II white CPO service dress uniform.

11. Chief Pharmacist's Mate, 1941-1948. This badge was used on the World War II khaki CPO service dress uniform.

12. Chief Pharmacist's Mate, 1943-1948. This badge was used on the short-lived World War II gray CPO service dress uniform. The eagle became more stylized in 1941, and its head looked to its right to face forward on this left-arm rating badge.

BUMED Archives



Chief Pharmacist's Mate Strott with the Marines in France, 1918. Note the unusual chevrons and red cross.

badge beneath the eagle and red cross. Both Navy and Marine Corps uniform regulations went into little detail as to the particulars of the insignia, resulting in numerous variations through the years. In early World War II, for example, corpsmen who were about to be deployed to island campaigns from the Marines' staging areas in Australia were issued locally-made pairs of right and left arm rating badges. This allowed them to wear their insignia on both sleeves as the Marines did.

Insignia on field uniforms were subject to trends which may not have been regulation. During many periods of combat, Marines and their corpsmen have worn no insignia so as to keep from identifying their seniority or importance to the enemy. In other periods, Navy rating insignia were attached, sometimes drawn with indelible ink, on to field blouses and jackets. The black metal shield and caduceus was prescribed as a collar device for corpsmen in the 1950's. There have been times, too, when corpsmen either chose or were required to wear Marine Corps chevrons equivalent to their rates (e.g., sergeant chevrons for HM2). The most extreme photographic evidence of this, perhaps, is a photograph of Chief Pharmacist's Mate George Strott at a battalion aid station in France in 1918. His sleeves are adorned with three points-up chevrons over two "rockers" with a red cross between the chevrons and arcs.

The primary reference for this article was U. S. Navy Rating Badges, Specialty Marks and Distinguishing Marks, 1885-1982 by John A. Stacey. Mr. Stacey's privately published work is the best, if only, definitive work on enlisted Navy insignia. ❑

HMCS (FMF) Hacala is a selected reservist drilling with Naval Reserve, Naval Hospital Great Lakes, IL, Detachment 613.

National Naval Medical Center Seeks Hospital Ship Artifacts

The National Naval Medical Center, Bethesda, MD, is seeking artifacts related to life aboard Navy hospital ships for a permanent display. Artifacts such as photos and personal memorabilia will be displayed with scale models of the Spanish-American War era USS *Solace* and the modern USNS *Comfort* as centerpieces.

For more information contact BUMED historian Jan K. Herman at 202-762-3248 or E-mail nmc9jkh@bumed70.med.navy.mil

Novice Nurse in Ambulatory Care Initiative

CDR Debbie Janikowski, NC, USN

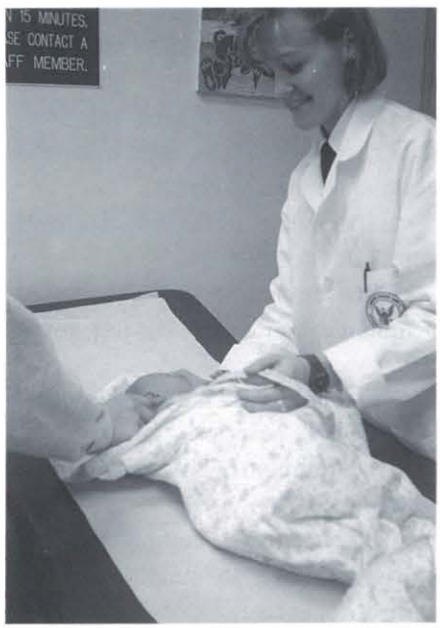
Timing, creativity, risk taking, and supportive mentors have turned the age-old problem of staffing and orienting novice nurses into a successful new program for Navy nursing and military medicine. During the summer of 1995, Nursing Services' Directorate at National Naval Medical Center, Bethesda, MD, began staffing plans for 47 ensigns graduating from OIS and reporting aboard in October and November. Simultaneously, a task group had been working on a plan to reorganize nursing services into product line services of Maternal Child, Medical, and Surgical Nursing. It was apparent during staffing meetings that the stress of orienting a high number of novice nurses with a limited number of inpatient preceptors had the potential of adversely impacting patient care, staff allocation, and morale.

ENS M. Gamboa attends a patient in the Gastroenterology Clinic.

The Ambulatory Care Nursing Department saw this as an opportunity to promote the specialty of ambulatory care nursing, encourage novice nurses to function independently, and improve continuity of care among inpatient and ambulatory specialties. As a result, the "Novice Nurse in Ambulatory Care Initiative" was developed and implemented to promote the professional growth and clinical, management, and leadership skill acquisition of the novice nurse which could be applied to the care of inpatients. The goals of this initiative are to:

- Expose the novice nurse to the concepts of continuity of care, product line service, and multidisciplinary collaborative practice.
- Increase the number of competent ambulatory nurses in the pipeline for future assignments in hospital-based, free-standing, and overseas ambulatory clinics.

Once the plan was developed, an agreement was negotiated for a 9-month ambulatory rotation to prevent transfers coinciding with the annual fall influx of new graduates. Each specialty clinic developed competency-based orientations and the following template was created for product line clinical rotations: Maternal Child, 4 1/2 months each in the Pediatric and OB/GYN Clinics; Surgical, 4 months and 1 week each in the Orthopedic and General Surgery Clinics and 2 weeks in the Urology Clinic; and Medical, 7 months in Gastroenterology Clinic and 2 weeks each in the Endocrinology, Internal Medicine, Rheumatology, and Allergy Immu-



ENS Tonya Schulz looks after an infant in the Pediatric Clinic.

nology Clinics. At the end of the 9-month Ambulatory Care experience, the ensigns will be assigned to similar inpatient populations. The following summarizes the ambulatory experience:

- One-on-one preceptorship and orientation by highly skilled and experienced nurses. The experience of ambulatory nurses ranges from 7 to 43 years with the average being 19 years.
- Daily exposure to experienced nurse role models and mentors functioning in clinical patient care, research, management, and leadership roles.
- Experience in access and continuum of care issues, case management, and managed care.
- Experience in nurse educator and patient advocate roles.
- Development of skills necessary to manage and train hospital corps staff.
- Development of multidisciplinary collaborative practices.
- Development of clinical and management skills.
- Competency in computer information systems to manage patient care.
- Experience in the multidisciplinary Performance, Evaluation and Improvement (PE&I) process.

Between October and November 1995, a total of 10 novice nurses were assigned to Ambulatory Care. In all honesty, it was hard to tell whose anxiety level was higher and who was more excited about this new program, the Ambulatory Care staff or the new ensigns! The enthusiasm was contagious as work began on orienting the newest members of our team. The Ambulatory Care ensigns are required to attend both Command and Nursing Orientations as well as the newly instituted 2-week Graduate Nurse Orientation, all scheduled within the first few weeks at the command. Assigned preceptors develop individual work schedules with patient-focused care as the center of all challenging learning experiences.

In addition to becoming proficient in venipuncture, IV therapy, the nursing process, and triage, these novice nurses have gained knowledge and skills in prioritizing tasks, managing unit activities, patient and family education, problem solving, and critical thinking. Depending on product line assignment, the following educational programs have been completed: Enterostomal Nursing Course, Arrhythmia Recognition, Advanced Cardiac Life Support, Pediatric Advanced Life Support, Neonatal Core Curriculum, Pediatric Core Curriculum, Ambulatory Operating Room Course, Conscious Sedation, and Family Advocacy Training. These accomplishments clearly demonstrate their motivation and the skill level novice nurses can obtain in an ambulatory care setting.

ENS C. Crerar works in the General Surgery Clinic.

Every 4 to 6 weeks informal lunch meetings are held to review progress made on personal and professional goals, share newfound knowledge and skills, talk through perceptions and anxieties, and make suggestions for improving the program. Professional journal articles are being written to document clinical skill acquisition, management and leadership development, and job satisfaction among novice nurses.

Self-reported impressions of the program from nurses, physicians, and the novice nurses are extremely positive. Common group themes are a high level of self-confidence and flexibility, a sense of belonging, teamwork, and enthusiasm. The first 6 months has brought to patient care an increased flexibility in staffing, scheduling and extending clinic hours, a perceived improvement in patient satisfaction, and increased patient and family education. Professionally, the initiative has created a compelling opportunity for advance practice nurses and mid-level and senior officers to enhance their educator and mentoring roles. An even stronger sense of teamwork and departmental cohesiveness has developed among the Ambulatory Care staff as they work toward the common goal of continual professional development for themselves and the novice nurse.❑

CDR Janikowski is Head, Department of Ambulatory Care, National Naval Medical Center, Bethesda, MD.

Combat Casualty Resuscitation Form

LCDR Kevin L. Greason, MC, USNR
LT Jan M. Berry, MC, USNR
CAPT Douglas H. Freer, MC, USN

"The battlefield is a scene of constant chaos." — *Napoleon Bonaparte*

In times of armed conflict, the number of combat casualties and the severity of their injuries often exceed the medical resources and capabilities of the facility and staff. Under such circumstances, those patients with the greatest chance of survival, in particular those whose treatment involves the least expenditure of time, equipment, supplies, and personnel, are managed first.*(1)*

A basic characteristic of the organization of modern military medical services is to distribute medical resources and capabilities to facilities at various levels of location and function, which are referred to as "echelons."*(2)* We recently completed a 6-month Western Pacific deployment as part of a Fleet Surgical Team (FST). The FST was stationed on board a Landing Helicopter Assault (LHA) class ship providing medical services as part of an Amphibious Ready Group comprising over 3,000 sailors and embarked marines.

Our ship was designated the primary casualty receiving and treatment ship (PCRTS) in support of combat operations; it is considered to function at the third echelon of combat medical care. By definition, third echelon combat medical care affords treatment of the casualty in a medical installation staffed and equipped to provide resuscitation, initial surgery, and postoperative treatment.*(2)* The PCRTS provides surgical support capabilities as close to the site of armed conflict as possible.

The combat casualty moves through the echelons of medical care in the battlefield and ultimately reaches the triage area of the PCRTS. Upon arrival the patient is triaged by the Casualty Coordinator, usually a general surgeon, and sent to one of many treatment stations. Trauma care at each treatment station is provided by a team of two corpsmen: the primary trauma care providers. The corpsmen provide treatment under the supervision of a general medical officer.

During a mass casualty situation, the general medical officer can be responsible for up to five acutely injured patients. Given the constraints placed on the general

surgeon and general medical officer, the function of providing the initial assessment and treatment of the combat casualty falls upon the corpsmen. Unfortunately, many corpsmen have limited experience in trauma management.

Trauma patients must be rapidly assessed and logical sequential treatment priorities established based on overall patient assessment. Patient management must consist of a rapid primary evaluation, resuscitation of vital functions, a more detailed secondary assessment, and finally, the initiation of definitive care.*(1)* A well thought-out trauma resuscitation form serving as a template can significantly aid the primary trauma care providers in this regard. These principles are well delineated in the Advanced Trauma Life Support (ATLS) Program.*(3)*

The ATLS Program stresses the importance of meticulous record keeping.*(1)* Precise chronological reporting is essential to help the primary trauma care providers evaluate the patient's needs and to quickly assess changes in the patient's condition. Accurate record keeping is of great importance because the combat casualty is cared for by multiple practitioners at different echelons of medical care; hospitals at different echelons are usually separated by great distances.*(2)* We have been unable to identify a trauma resuscitation form that satisfies these requirements and yet fits the needs specific to the military theater of operations.

Recognizing these deficiencies, we produced a trauma resuscitation form (see appendices 1-4, pages 15-18) for use on board our PCRTS. It serves as a template for the assessment and treatment of the trauma patient and encompasses areas of trauma management more specific to military conflict such as chemical and burn injuries.

Materials and Methods

The concept of a trauma resuscitation form was taken from the ATLS Student Manual.*(4)* Using Microsoft Excel Version 5.0 software (Microsoft Corporation, Redmond, WA 98052-6399) run on an IBM compatible pentium personal computer, an outline of the trauma resuscitation form was made. Illustrations were added to incorporate areas specific to burn injury.*(5,6)* A negative of the completed form was made using a Nuarc 20 inch x 24 inch camera. The negative was stripped into a flat and burned onto a printing plate using a Nuarc platemaker. The plate was transferred to an AB Dick 9805 printing press and the completed form printed onto standard 11 x 17 inch duplicating paper. This print folded in half produced the final four-page trauma resuscitation form.

Comment

This resuscitation form serves as a guide to help primary trauma care providers complete and document a thorough trauma evaluation of a combat casualty in a comprehensive and concise manner. One area of concern not dealt with in this version is that of thermonuclear warfare. We are unsure at this time of what and how best to incorporate any information on this topic into the trauma resuscitation form. The trauma resuscitation form has practicality in the management of most trauma patients seen in the military theater of operations and is made available for use by other military medical personnel.

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1. American College of Surgeons Committee on Trauma. *Advance Life Support Student Manual: Initial Assessment and Management.* Chicago, IL: American College of Surgeons; 1993.
2. Bowen TE, Bellamy RF, eds. *Emergency War Surgery.* 2nd rev. Government Printing Office: Washington, DC; 1988.
3. American College of Surgeons Committee on Trauma. *Advanced Trauma Life Support Program.* Chicago, IL: American College of Surgeons; 1993.
4. American College of Surgeons Committee on Trauma. *Advanced Life Support Student Manual: Resource Document Eight.* Chicago, IL: American College of Surgeons; 1993:361-364.
5. Demling RH. Burns. In: Greenfield LJ, Mulholland MW, Oldham KT, Zelenock GB, eds. *Surgery: Scientific Principles and Practice.* Philadelphia, PA: JB Lippincott Co; 1993.
6. Goodwin CW, Finkelstein JL, Madden MR. Burns. In: Schwartz SI, Shires GT, Spencer FC, eds. *Principles of Surgery.* 6th ed. New York, NY: McGraw-Hill, Inc; 1994. ❑

Dr. Greason is General Surgeon, Fleet Surgical Team Three. Dr. Berry is Battalion Surgeon, First Battalion, First Marines. Dr. Freer is CATF Surgeon, Fleet Surgical Team Three.

Trauma Resuscitation Form

Name:	SSN:
Date and time of injury:	Date and time of arrival:

Chief complaint:

Pre-hospital information

Mechanism of injury:

☐ Gunshot wound ☐ Stabbing ☐ Burn
☐ Chemical casualty
☐ Other:_____

Procedures before arrival

☐ Airway: type_____ size #_____
☐ O_2 @_____L/min via_____
☐ IV's: location and #_____
☐ Chest tube: location_____size #_____
☐ Splints: Type_____
☐ Medications:_____
☐ Chemical casualty:
☐ Decontamination date/time:_____

	Dosage	Date/time
☐ Atropine:		
☐ 2-PAM:		
☐ Other:		

☐ Other procedures:_____

AMPLE history

Allergies:
Medications:
Past illnesses:
Last meal: Last Tetanus:
Events:

Initial assessment

Airway

☐ Patent ☐ Obstructed

Breathing

☐ Normal ☐ Labored
☐ Symmetrical ☐ Asymmetrical
Trachea midline? ☐ Yes ☐ No

Breath sounds:	Right	Left
Present	☐	☐
Clear	☐	☐
Decreased	☐	☐
Absent	☐	☐
Rales/Rhonchi	☐	☐

Crepitus: ☐ Yes ☐ No

Initial assessment

Circulation

Skin/mucous membrane color:
☐ Pink ☐ Flushed
☐ Pale ☐ Jaundiced
☐ Ashen ☐ Cyanotic

Skin temperature:
☐ Warm ☐ Hot ☐ Cool

Skin moisture:
☐ Normal ☐ Dry ☐ Moist

Pulses:

	Carotid		Radial		Femoral	
	R	L	R	L	R	L
Normal	☐	☐	☐	☐	☐	☐
Bounding	☐	☐	☐	☐	☐	☐
Weak	☐	☐	☐	☐	☐	☐
Absent	☐	☐	☐	☐	☐	☐

Disability

Glasgow Coma Scale (circle appropriate scores):

		Score:
1. Eye opening:		
	Spontaneous	4
	To voice	3
	To pain	2
	None	1
2. Verbal:		
	Oriented	5
	Confused	4
	Inappropriate words	3
	Incomplete words	2
	None	1
3. Motor:		
	Obeys commands	6
	Localizes to pain	5
	Withdrawls to pain	4
	Flexion	3
	Extension	2
	None	1
	Total GCS	_____

Pupillary response

Pupil reaction:	Right	Left
Brisk	☐	☐
Constricted	☐	☐
Sluggish	☐	☐
Dilated	☐	☐
Nonreactive	☐	☐
Size	____mm	____mm

Trauma Resuscitation Form

Physical examination

Age (years):_____ Height (inches):_____ Weight (kg's):_____

Head, eyes, ears, nose, throat:

Neck:

Chest:

Back:

Cervical/Thoracic/Lumbar spine:

Abdomen:

Perineum and rectum:

Extremity:

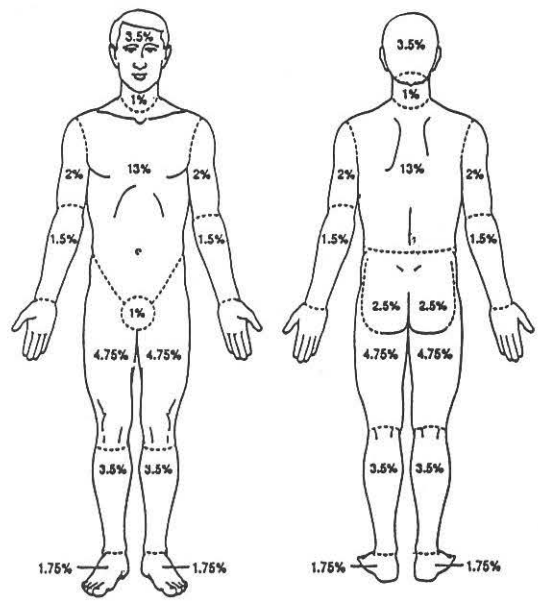
Skin:

Neurologic:

Other:

Diagram for documenting injuries
(Identify injury site by number)

1. Laceration
2. Abrasion
3. Hematoma
4. Contusion
5. Deformity
6. Fracture
7. GSW(s)
8. Stab wound(s)
9. Pain
10. Cold injury
11. Edema
12. Amputation
13. Avulsion
14. Burn
15. Other (Describe)



(With permission from JB Lippincott Company. After Demling RH. Burns. In: Greenfield LJ, Mulholland MW, Oldham KT, and Zelenock GB. eds. Surgery: Scientific Principles and Practice. Philadelphia, JB Lippincott Company, 1993.)

Trauma Resuscitation Form

Burn data (fill in appropriate boxes)

Area	Adult BSA	2°	3°	Total
Head	7			
Neck	2			
Ant. Trunk	13			
Post. Trunk	13			
R. Buttock	$2^{1/2}$			
L. Buttock	$2^{1/2}$			
Genitalia	1			
R.U. Arm	4			
L.U. Arm	4			
R.L. Arm	3			
L.L. Arm	3			
R. Hand	$2^{1/2}$			
L. Hand	$2^{1/2}$			
R. Thigh	$9^{1/2}$			
L. Thigh	$9^{1/2}$			
R. Leg	7			
L. Leg	7			
R. Foot	$3^{1/2}$			
L. Foot	$3^{1/2}$			
	Total			

(With permission from McGraw-Hill Inc. After Goodwin CW, Finkelstein JL, and Madden MR. Burns. In: Schwartz SI, Shires GT, and Spencer FC, eds. Principles of Surgery: Sixth edition. New York, McGraw-Hill Inc., 1994.)

Laboratory data

CBC:	Lytes, BUN, Cr, Glu:	U/A:

ABG:

Time	FiO_2	pH	PO_2	PCO_2	BD

Other labs:

X-Ray

C-spine:

CXR:

Pelvis:

Other:

Trauma Resuscitation Form

Procedures performed by trauma team		Medications			
Time:	Procedure:	Time:	Drug:	Dosage:	Route:

Trauma fluid resuscitation data

Estimated initial postburn IV fluid requirement

1. IV fluid of choice: Lactated Ringer's solution.
   (Use the following equations)
2. Total fluid requirement (TFR):
   TFR = 4 ml x wt (kg's) x % burn (2^{o} and 3^{o})

   TFR = (4 x _____ x _____) = _____cc
3. Estimated fluid requirement 1^{ST} 8 hours **post burn**:

   (TFR/2) = _____cc
4. Estimated fluid requirement next 16 hours **post burn**:

   (TFR/2) = _____cc

Resuscitation area fluid intake and output

Intake:		Output:	
LR	_____ml	Blood	_____ml
PRBC	_____ml	Urine	_____ml
FFP	_____ml	NG tube	_____ml
Platelets	_____ml	Chest tube	_____ml
Other	_____ml	Other	_____ml
Total	_____ml	**Total**	_____ml

Vital signs

Time:								
BP:								
Pulse:								
Temp:								
Resp:								
GCS:								

Notes:

Impression:

Plan:

Signature:

(With permission from the American College of Surgeons Committee on Trauma, *Advanced Trauma Life Support Student Manual*, 1993 edition.)

From the Bench to the Bedside:

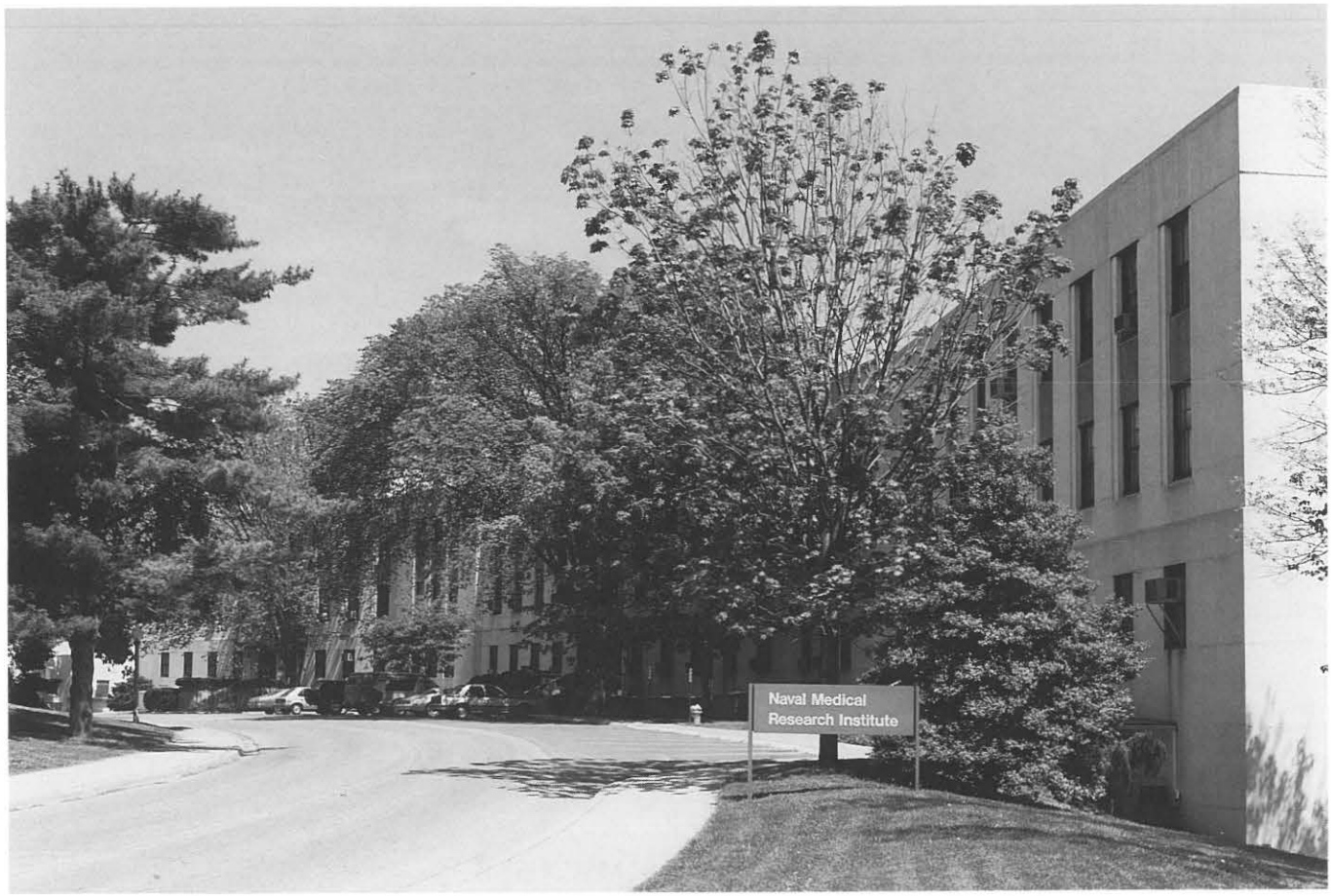
Immune Cell Biology Program Is Making Therapeutic Immunoregulation a Reality

LT Patrick J. Blair, MSC, USNR
LT Douglas K. Tadaki, MSC, USNR
Kelvin P. Lee, M.D.

Today the military plays an increasing role in providing humanitarian assistance to underdeveloped nations and in policing regional and ethnic hot spots. As the mission of the military evolves, planners are adopting strategies to respond to the risk of mass casualties resulting from nuclear, chemical, and biological weapons and to the heightened risk that deployed troops face to many infectious agents ranging from HIV to dengue fever. To counter these threats, a viable military medical research unit is necessary to provide new combat medical care technologies.

Recognizing that need, the Naval Medical Research Institute (NMRI) in Bethesda, MD, has investigated immediate operational and medical problems facing sailors and marines in the field since 1942. In the past, NMRI investigators have advanced techniques for the collection and preservation of tissue for grafting and have played important roles in the development of telemetry medicine, the heart-lung machine, and procedures for lowering body temperature during surgery. Now under the command of CAPT Thomas J. Contreras, Jr., NMRI has earned a reputation as a world-class research institute. NMRI scientists have continued to lead in developing new therapies to treat militarily-related problems with research programs including diving and environmental physiology, bone marrow research, infectious diseases, and combat casualty care. Some of the most exciting advances at NMRI have occurred within the Immune Cell Biology Program where researchers are developing strategies to regulate the immune response.

An immune response is generated when white blood cells, or lymphocytes, recognize and respond to either foreign or, in some cases, "self" antigens (proteins). Lymphocytes are categorized into two general subgroups: B lymphocytes (B cells) which respond by releasing antibodies and T lymphocytes (T cells) which coordinate the larger immune response. For years it has been known that T lym-

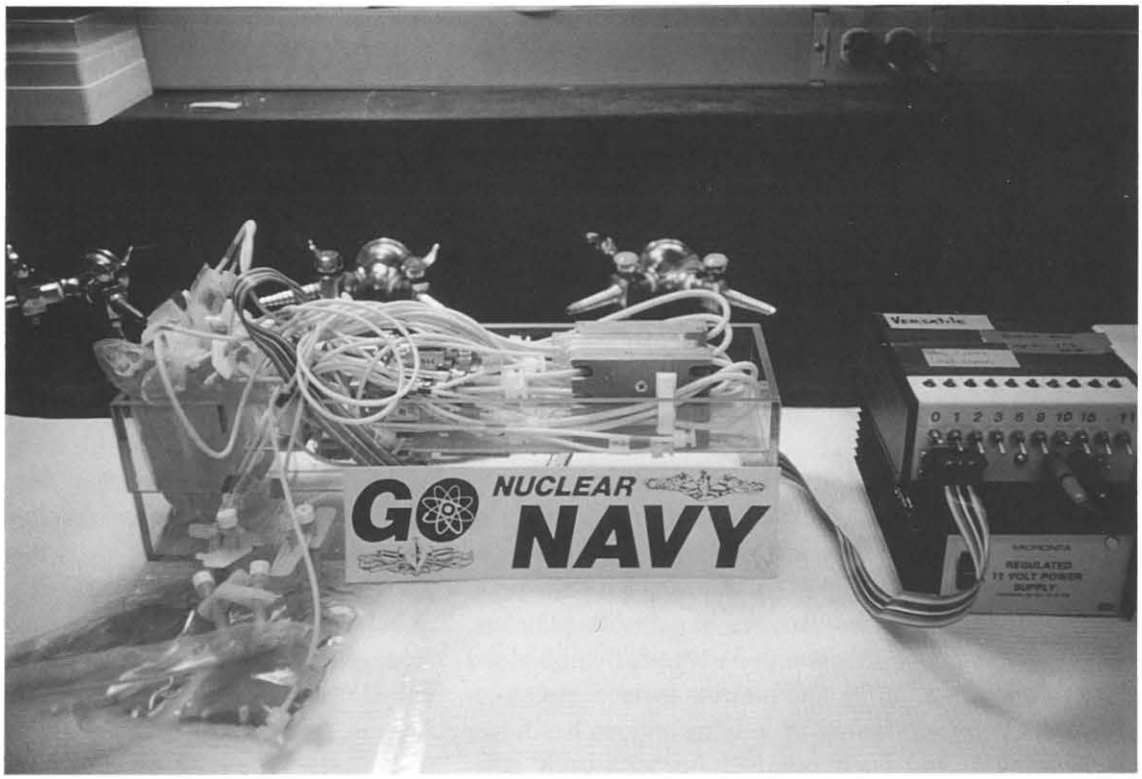


Naval Medical Research Institute, Bethesda, MD

phocytes are activated by specific signals generated through a cell-surface receptor called the T-cell receptor. In 1987 CAPT Carl H. June, MC (Ret.), and his colleagues made the pioneering observations that optimal stimulation of T lymphocytes required activation of another T-cell receptor called CD28. In 1991 a *New York Times* article entitled "Biologists Discover New Immune Switch" described this pathway as "the holy grail of immunology."(*1*) Dr. June established the Immune Cell Biology Program (ICBP) in 1990 at NMRI to specifically study CD28's role in the generation of immune responses. From 1990 to 1995 Dr. June served as head of the Immunobiology Department while additionally performing and publishing much of the early work in the budding field of T-cell costimulation.

Today under the leadership of CDR David M. Harlan, MC, the ICBP is one of the leading laboratories in the world studying T-cell activation. By examining how the immune system works, researchers within ICBP hope to devise new strategies that will ultimately be available for clinicians to both augment desired immune responses (such as those needed to improve vaccines or to fight cancer) and to prevent undesired immune responses such as those involved in transplant rejection and in autoimmune disease.

This research supports combat casualty care by providing an effective therapy for injuries sustained on the battlefield such as weapon-induced bone marrow failure, severe burns, organ failure, and mass trauma casualty care. In order to accomplish these goals, the ICBP is organized into three specific areas of research: (1) the Stem Cell Biology Branch which is tasked with development of marrow reconstitution therapies, (2) the Immune Augmentation Branch which is developing technologies to augment the immune response, and (3) the Immune Suppression Branch which is developing novel therapies to specifically inactive undesired immune responses.



Bioreactor expansion system for growing bone marrow stem cells. The unit pictured was launched on STS-69 *Endeavour* 7-18 Sept 1995 to test the effects of zero-gravity on the development of bone marrow cells in vitro in addition to the durability of the unit.

Meeting the Threat of Bone Marrow Casualties

The three types of circulating blood cells, i.e., red blood cells (RBCs), platelets, and white blood cells (WBCs), originate in the bone marrow from progenitor cells called stem cells. Since circulating mature blood cells have a finite life span varying from hours to 120 days, the bone marrow must constantly replace senescent circulating blood cells. Stem cells therefore have two defining characteristics; they are capable of making new copies of themselves (self-generation) and they can differentiate into each of the three mature circulating blood types (pluripotential capability). However, these stem cells represent an Achilles heel for victims exposed to ionizing irradiation or chemical warfare agents. That is, while casualties may survive the initial insult from these agents, they often succumb days or weeks later when their bone marrow fails to replace the natural loss of circulating blood cells. If the bone marrow is severely damaged but not destroyed, then hematopoietic growth factors can speed the recovery of the "stunned" bone marrow. During the 1991 Gulf War, when military intelligence suggested that chemical weapons might be used against allied forces, investigators within ICBP tested, then received FDA approval for a novel growth factor therapy to treat the anticipated casualties. The relationship between ICBP investigators and their collaborators in private industry lead to the donation of this growth factor to the military in sufficient quantities to treat hundreds of chemical agent casualties had they occurred. This timely effort by ICBP investigators was cited in the Congressional Record for its potential lifesaving impact.

Unfortunately, in many casualty scenarios the bone marrow will be completely destroyed following insult from chemical agents or ionizing irradiation. In such cases the only presently viable option is bone marrow transplantation. However, a problem that exists is that a casualty with bone marrow failure can only be transplanted if a matched donor is found. Remarkably, through the efforts of the Bone Marrow Registry (another NMRI research program), matched donors can be found for up to 70 percent of some populations. Nonetheless, in a mass casualty situation the logistics of finding suitable donors would be immense and impractical. Recognizing these severe limitations, ICBP investigators lead by Drs. Kelvin Lee and Thomas Davis of the Stem Cell Biology Branch have been working on a system whereby an individual's stem cells could be isolated from peripheral blood, stored, and then grown outside the body if needed. This effort culminated in a

successful collaborative effort between researchers from the Navy, Army, and private industry who, working together, developed a self-contained bioreactor that can produce a 650-fold increase in the total number of bone marrow cells and a 100-fold increase in the number of stem cells within a 2-week period.(*2*) Using this technology military physicians could treat personnel with otherwise fatal acute bone marrow injuries without the need for a matched donor. In 1996 this technology received the Federal Laboratory Consortium (FLC) Award for Excellence in Technology Transfer and a patent protecting this technology was issued. This was the first Navy patent to be developed under a Cooperative Research and Development Agreement (CRADA) to be licensed.

Augmenting the Immune Response Against Infectious Diseases and Cancer

Earlier this year researchers in the Immune Augmentation Branch of the ICBP made a significant breakthrough in their goal of augmenting desired immune responses. Focusing initially on the pronounced depletion of $CD4^+$ T cells that eventually causes morbidity and mortality in HIV-infected patients, scientists have identified and utilized a CD28-mediated effect that permits the polyclonal (i.e., all subtypes) expansion of large numbers of T cells without increasing viral replication.(*3*) Clinicians have for years transfused red blood cells, platelets, and even some types of white blood cells into patients in need, but transfusion of T lymphocytes has never been possible because each individual's T cells are unique. Using the new CD28-mediated T-cell growth system, scientists can now generate therapeutic levels of autologous (i.e., self) polyclonal or antigen-specific $CD4^+$ T cells thereby permitting $CD4^+$ T-cell transfusions for immune reconstitution.

This technique has far-reaching implications. For example, T cells grown outside the body may be an ideal gene therapy delivery vehicle for persons with HIV-1 infection and other illnesses. In addition, Drs. June and Bruce L. Levine foresee transfusing patients with $CD4^+$ T cells that specifically recognize targets as a novel therapy for illnesses ranging from infectious diseases to cancer, so called "adoptive immunotherapy." That is, researchers ultimately hope to educate T cells to an infectious

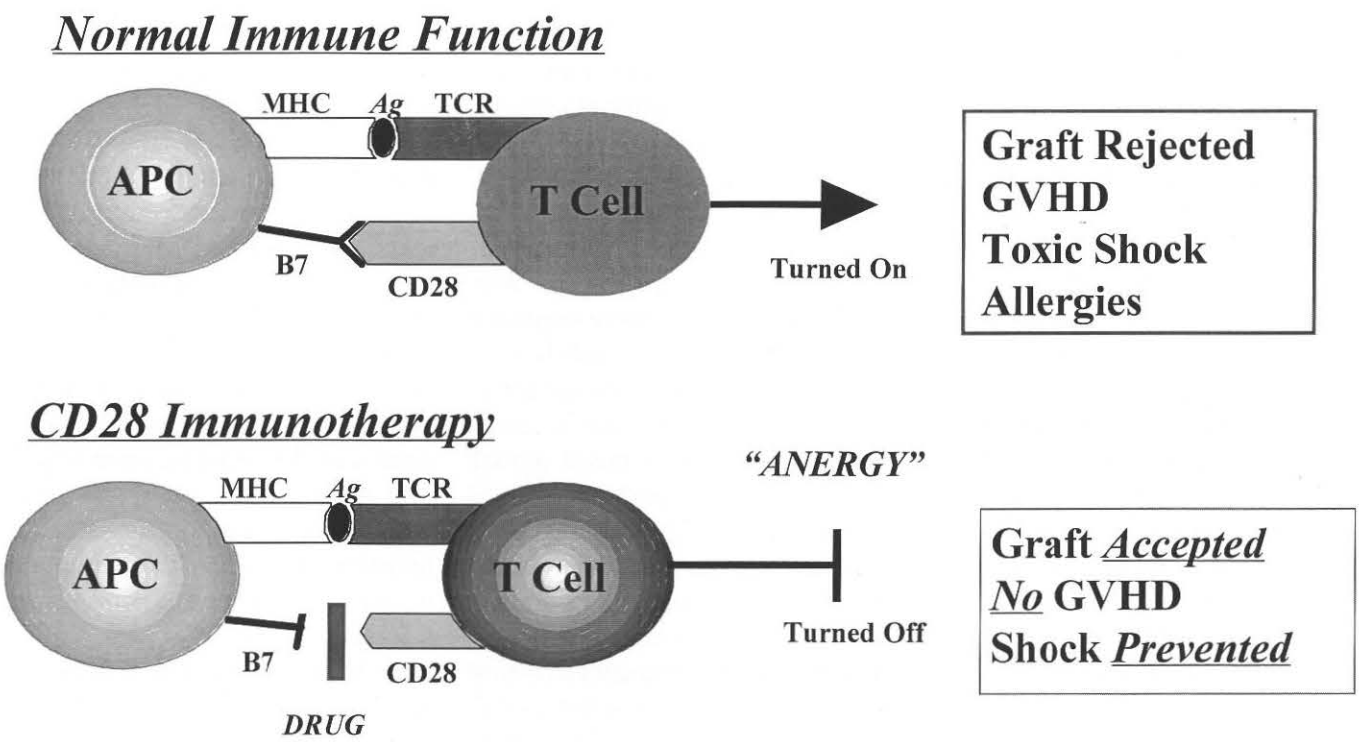


Figure 1. Diagram of normal immune function and anergy. Ag—Antigen; APC—Antigen presenting cell; B7—costimulatory ligand; CD28—T-cell costimulatory receptor; GVHD—Graft *versus* host disease; MHC—Major histocompatibility complex; TCR—T-cell receptor. Substances development within the Immune Suppression Branch block immune function and induce anergy.

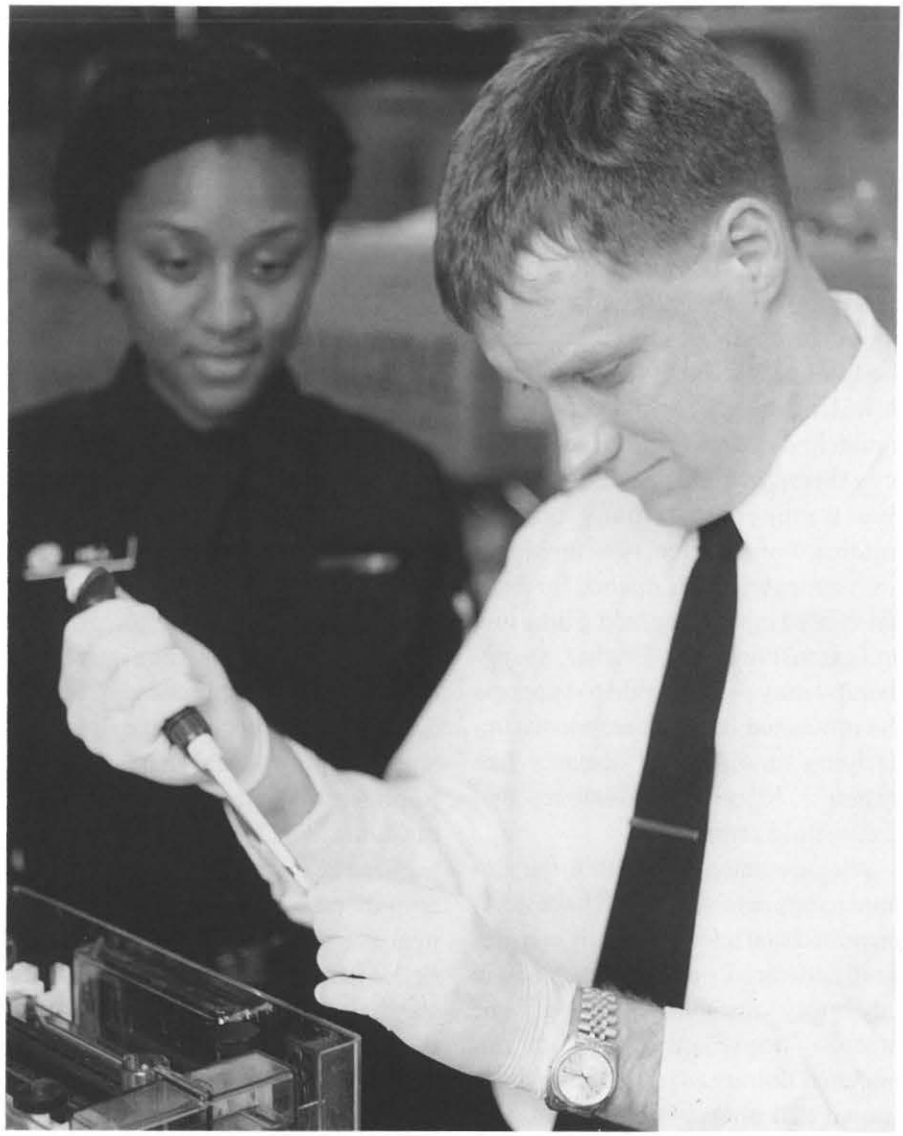
agent or to a cancer cell in vitro (in a test tube), and to then expand those T cells using their unique culture system prior to transfusing the cells back into the patient. In May 1996 these scientists won FDA approval for a phase I study of this adoptive immunotherapy, initially studying HIV-infected military personnel. The first active duty sailor enrolled in this study received an initial T-cell transfusion in August 1996.

Using Immunosuppression to Aid Organ/Limb Transplantation

The selective use of immune tolerance to make organ and limb transplantation practical for both civilian and military application has been pursued by CDR Harlan and colleagues in the Immune Suppression Branch of ICBP. In most cases, optimal activation of an immune response results only after a dual signal is generated between a T cell and an antigen-presenting cell (APC). On occasion, an undesirable immune response is initiated, resulting in autoimmune disorders. CDR Harlan and his colleagues have devised the means to dampen or eliminate unwanted immune responses by blocking one of these two signals. For instance, they have followed the observation that by blocking CD28 signaling, T lymphocytes which normally react to a foreign protein are "re-educated" and do not initiate an immune response against that specific protein, so called "anergy therapy" (Figure 1).

The practical implication of this strategy is particularly important in the area of organ transplantation where anergy therapy promises to overcome two persistent obstacles; the limited supply of organs for transplantation and an imperfect ability to prevent rejection of the transplant. Current immune suppressive techniques are costly and result in severe side effects to the patient. Moreover, the available techniques rely on drugs that suppress the entire immune system, rendering the patient susceptible to even the most mundane infections and increasing their cancer risk. Even if rejection could be overcome, the number of organs currently available for transplantation is grossly inadequate because only living-related (for kidney) and cadaveric organs are transplanted. The mismatch between organ supply and demand is even greater than current estimates would predict in that trauma-induced organ failure patients, especially important in the military, are not currently considered candidates for a replacement organ.

Anergy therapy promises to overcome both obstacles. Anergy therapy, achieved by administering specific antibodies and/or bioengineered molecules for a 2-week period following transplantation, specifically targets



HM3 JaSon E. Wright, NSHS Bethesda, MD

LT Patrick Blair, MSC, USNR, and HM3 Maria Hill load an SDS-PAGE gel for protein analysis.

only the immune response against the transplanted organ, leaving the rest of the patient's immune defenses intact. This therapy has the potential to make transplantation of totally unmatched human organs or even organs from specially raised animals (xenografts) a reality. The use of animal (most likely pig) organs could overcome the current organ donor shortage and save the lives of 50-100,000 patients who now die each year while waiting for a matched donor. Additionally, anergy therapy would provide an effective treatment for many combat injuries. For instance, new therapeutic avenues would be opened for combat-related injuries including limb loss and extensive burns. Further, anergy therapy may prove useful to suppress the unwanted immune responses underlying autoimmune diseases like systemic lupus erythematosus and rheumatoid arthritis.

Already scientists within the Immune Suppression Branch have demonstrated that anergy therapy can prevent undesired immune reactions in laboratory animals following bone marrow transplantation from unmatched donors.(*4*) Also, they have shown that anergy therapy can control disease in animal models for diabetes, multiple sclerosis, and toxic shock syndrome. Critical preclinical studies using anergy therapy to counter the immune response following organ transplantation from an unmatched donor have been initiated by ICBP scientists. These studies have yielded preliminary results that are extremely encouraging and which suggest that these therapies will be utilized in the immediate foreseeable future.

Rising to the Challenge

As stated by Dr. June in 1993, the goal of the ICBP is "to rapidly move research forward from the bench to the bedside." To hasten the realization of this goal, researchers within the ICBP have formed collaborative Navy/industry relationships with several partners in the biomedical field. Negotiations initiated with the Repligen Corporation of Cambridge, MA, resulted in the signing of a CRADA in December 1991 to develop anergy therapy for clinical use. This agreement was the largest Navy biotechnology CRADA at the time. The ICBP subsequently conducted a highly productive scientific collaboration with investigators at Repligen defining the mechanisms underlying anergy therapy while Repligen initiated the manufacture of clinical grade reagents. During this time interest in anergy therapy increased tremendously. In October 1995 the rights for anergy therapy were acquired from Repligen by Genetics Institute (also of Cambridge, MA), an industry pioneer in the cytokine treatment of human disease. Recently CDR Harlan negotiated a new CRADA with Genetics Institute. Already this partnership has resulted in collaboration with the University of Wisconsin testing the efficacy of anergy therapy for unrelated kidney transplantation in monkeys. Early results have been very promising and have led to yet another CRADA between Biogen, Inc. (Cambridge, MA), the Navy, Genetics Institute, and University of Wisconsin for improvements in anergy therapy. These advances represent the first important steps in making anergy therapy a feasible therapy for man. Further collaborative efforts are under way with the Diabetes Research Institute at the University of Miami, FL.

Researchers within the Immune Cell Biology Program have played an integral role in understanding a key immunoregulatory molecule, CD28. Protection of these NMRI discoveries has been sought in more than 25 Navy-filed patents. Through the utilization of robust and expanding scientific collaborations, Dr. June, CDR Harlan, and their colleagues have made the ICBP an internationally recognized program at the forefront of biomedical research. Additionally, they have been able to transition their basic science advances into clinically and militarily useful products and therapies. By always focusing on the needs of sailors and marines in the field, researchers at NMRI hope to develop new medical therapies to revolutionize combat casualty care. The therapies that they are developing promise to do just that and much more. While the medical care of sailors and marines is the primary objective of researchers at the NMRI, this research team may well change the very practice of medicine for the good of all mankind.

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Ibuprofen—
Induced Aseptic Meningitis

CDR Robert Hoyt, MC, USNR
LT Joseph F. LePage, MC, USNR
LT Steven R. Lenga, MC, USNR

Ibuprofen is frequently prescribed by medical officers to remedy common musculoskeletal ailments of sailors and marines aboard Navy ships. Drug-induced aseptic meningitis has been associated with nonsteroidal anti-inflammatory drugs with ibuprofen the most often cited in the literature. Although an uncommon side effect of ibuprofen, if used ubiquitously in a large population, one would expect an increased prevalence. Since meningitis is a life-threatening illness, the necessary initial management of these patients has the potential to affect force readiness.

Case Report

A 23-year-old active duty male was seen 1 day prior to admission for lumbar strain in the emergency room (ER) at the Naval Hospital Pensacola, FL, and was sent home with prescriptions for Motrin and Flexeril on 8 Sept 1994. The patient stated that he took Flexeril that evening and went to sleep. Upon awakening the next morning he took Motrin and within 2 hours he had nausea, emesis times four, severe throbbing headache, myalgias, and fatigue. As the day progressed he developed neck stiffness and the return of his back pain. He presented to the ER with a temperature of 104°F despite Tylenol. He denied any chest pain, shortness of breath, cough, diarrhea, or recent travel. Review of systems was otherwise unremarkable. His past medical history was significant for an admission to the Naval Hospital Orlando, FL, the previous year on 23 June 1993 for similar symptoms. On that occasion he had strained his back and had sought care in the ER. Similarly, within 2 to 3 hours of taking the Motrin he experienced severe headache, nausea, emesis, neck stiffness, and fatigue.

Past surgical history was noncontributory. Medications on admission were Motrin and Flexeril. He had a known drug allergy to codeine. Family history was noncontributory. He was a student at Naval Training Center Corry Station and resided with his wife in Pensacola. He denied alcohol or tobacco use.

On physical examination he was a pale-appearing, well-developed, well-nourished white male in moderate distress, responding appropriately to questions. His vital signs were BP 160/80, pulse 116, temperature 104°F, and respirations 20/min. On HEENT exam PERRLA, EOMI, fundoscopic exam with discs sharp and flat bilaterally, TM's clear, nares clear, oropharynx clear. Neck exam positive Kernig's and Brudzinski's sign. No lymphadenopathy. Heart was tachycardic with normal S1 and S2, no murmurs, rubs, or gallops. Lungs were clear to auscultation with good bilateral breath sounds. Abdomen with bowel sounds present, soft, nontender, nondistended, no hepatosplenomegally, and no masses. Extremities nega-

tive for clubbing, cyanosis, or edema. On neurologic examination, the patient was alert and oriented times three. Cranial nerves II-XII were intact. Motor strength was 5/5 in all extremities. Sensory was intact, symmetric to light touch and pin-prick. Reflexes were 2+, symmetric. Cerebellum normal finger-nose-finger, rapid alternating movements. Gait slow but normal.

Laboratory evaluation revealed WBC count of 23,800 with a manual differential of 64 segs, 20 bands, 5 lymphocytes, and 11 monocytes. Hemoglobin/hematocrit were 14.5/42. Platelets were 333,000. Serum chemistries were normal. Urinalysis was normal. Spinal fluid was remarkable for 3,300 WBC, no RBCs, 80 polys, and 20 monocytes. Gram stain showed many WBCs and no organisms. Protein 372, LDH 0, glucose 60.

Patient was admitted for presumed bacterial meningitis and started on IV ampicillin and Claforan. CSF bactogens for H. influenza, Group B Strep, S. pneumoniae, E. coli, and N. meningitis (A, B, C, Y, W) were all negative. CSF cultures and blood cultures x 2 were negative for growth. Patient's clinical recovery was unexpectedly rapid. A repeat spinal tap 2 days after admission revealed only 79 WBC, protein 43, and glucose 56. Repeat CSF cultures and bactogens were negative. Antibiotics were discontinued on hospital day 3 and patient remained afebrile until discharged to active duty on hospital day 6. Repeat blood cultures x 4 were negative.

Discussion

Ibuprofen-induced aseptic meningitis has been well documented in the medical literature. Many of the previously reported cases have occurred in patients with lupus, mixed connective tissue diseases, or autoimmune disorders. By comparison, there have been relatively few reports of otherwise healthy individuals with this sensitivity to ibuprofen. History taking should be stressed in cases of culture negative presumed bacterial meningitis. At least one such case has documented intrathecal IgG synthesis and immune complex formation suggesting an antigen-specific process requiring the presence of or exposure to ibuprofen. Though rare, we believe that the ubiquitous use of ibuprofen to remedy musculoskeletal pain could invite an increased prevalence of this disorder in a young, military population. Upon initial presentation this disorder mimics bacterial meningitis which is a life-threatening illness and a medical emergency. The cerebrospinal fluid analysis tends to mimic bacterial more than viral meningitis. This can potentially affect force readiness of deployed units. We would recommend consideration for prescribing extra strength acetaminophen for common musculoskeletal complaints when possible.

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In Memoriam

RADM Henry A. Sparks, MC (Ret.), former Deputy Surgeon General, died of cancer at his home in Meadow Vista, CA, on 7 Feb 1997. He was 72.

Dr. Sparks was born in Woodland, CA, on 22 Nov 1924. He enlisted in the Naval Reserve (V-1 Program) in 1942 while attending Placer Junior College, in Auburn, CA. He reported for active duty as a student in the V-12 Program in 1943 at the College of the Pacific, Stockton, CA, and was released from active duty in January 1946.

In the summer of that year he was commissioned an ensign in the Naval Reserve and, under Navy sponsorship, attended the University of Southern California School of Medicine, receiving his M.D. degree in 1948.

Dr. Sparks completed his internship and first year of graduate training as a resident in internal medicine at Naval Hospital Long Beach, CA, in 1948-49 and 1949-50, respectively. In 1950 he reported for duty with the U.S. Fleet Activities, Yokosuka, Japan, and embarked for South Korea with Mobile Surgical Team One. On 15 Sept 1950, LST-898 and the team landed with the Marine Corps at Inchon.

In 1951 Dr. Sparks returned to CONUS to resume his residency in internal medicine at the National Naval Medical Center (NNMC), Bethesda, MD. Three years later he was assigned to the

Medical Unit with the Commander in Chief, Atlantic Fleet. He then served a tour at Naval Hospital San Diego, CA, (1955-58) in the department of internal medicine. He then served as an internist at the Naval Medical Unit, Tripler Army Hospital, HI, from 1958 to 1960. From 1960 to 1963 he was a member of the staff of Naval Hospital Camp Pendleton, CA. He then returned to NNMC Bethesda as supervisor of the Internal Medicine Training Program and Assistant Chief of Medicine (1963-1966).

Dr. Sparks became Chief of the Medical Service at Naval Hospital Oakland, CA, in 1966. He became commanding officer of Naval Medical Research Unit No. 3 in Cairo, Egypt, in 1970 and, 4 years later, was promoted to flag rank and assigned duty as commanding officer of the Naval Regional Medical Center, Oakland, CA. In 1977 RADM Sparks reported to the Bureau of Medicine and Surgery as the Assistant Chief for Operational Medical Support. The following year he assumed duty as Deputy Surgeon General.

Following his retirement from the Navy in 1981, Dr. Sparks continued his involvement in medicine by serving as consultant to the government of Saudi Arabia and as a field surveyor for the Joint Commission on the Accreditation of Health Organizations. In addition, he served as Medical Director at Rome Hospital and Murphy Memorial Hospital in Rome, NY, and the House of the Good Samaritan Hospital in Watertown, NY.

Dr. Sparks was a fellow of the American College of Physicians, and a member of the American Society of Tropical Medicine and Hygiene. He was also a diplomate of the American Board of Internal Medicine, a member of the Society of Medical Consultants to the Armed Forces, a fellow of the Royal College of Physicians, a fellow of the Egyptian Public Health Association, a member of the Royal Society of Medicine headquartered in London, and a member of the Explorers Club. He held the Legion of Merit, the Navy Unit Commendation Ribbon for his service in the Korean conflict, American Campaign Medal, World War II Victory Medal, Navy Occupation Service Medal with Asia clasp, National Defense Service Medal, Korean Service Medal, and United Nations Service Medal.

Naval Medical Research and Development Command Highlights

●Three Navy Patents Issued for Potential Treatment of Septic Shock

In combat a wounded sailor or marine may survive initial blood loss, only to succumb to multiple organ failure due to septic shock. Septic shock is the 13th leading cause of death in the United States with 100,000 deaths annually. Septic shock may occur in the course of almost any severe infection, most commonly, the infection is produced by gram-negative bacteria although other bacteria, viruses, fungi, and protozoa may also be causes. The Navy received three patents for inventions for potential therapeutic treatments of septic shock. These treatments have the possibility of lessening morbidity and mortality by protecting against septic shock, adult respiratory distress syndrome, and other inflammatory complications of shock at the cellular level (these therapies involve antisense oligonucleotides which reduce expression of adhesive proteins). The Navy's interest in patents parallels that of private industry even though the Navy does not compete in the commercial market. A patent owned by the Navy may be used to transfer Navy-developed technology to the public or private sector. The patent which the Navy receives may be licensed to interested parties who agree to commercialize the invention for the benefit of the general public. Twenty-seven Navy patents generated by the Naval Medical Research and Development Command are outlined on the command's homepage at www.dmso.mil/NMRDC.

●Network System for the Remote Site Screening of Potential Aviators

The U.S. Navy spends $1 million to train one pilot. The current screening test used for selecting eligible pilot candidates is the paper-and-pencil Aviation Selection Test Battery (ASTB), which is annually administered to thousands of applicants at over 200 remote sites worldwide. This test battery is used to determine which candidates have the necessary skills to earn their "Wings of Gold." The test battery degrades over time and new test items must continually be added for validation. The volume of testing and the numerous resources allocated for selecting and training aviators makes the ASTB an ideal computer-oriented tool to be placed on the Internet. Researchers at the Naval Aerospace Medical Research Laboratory, Pensacola, FL, are developing a prototype computerized, worldwide web version of the ASTB. The goal of the research is to develop custom software for a secure, network-capable test battery that: (1) can be downloaded remotely by verified users, (2) is equivalent to the paper-and-pencil test, and (3) is validated against flight performance. The software will use industry standard protocols and be evaluated using local networks. The computerized test battery includes test section timing, item marking, and backtracking. The system is designed to run on a minimum 486/25 computer, and remote site downloads of the entire test battery have been accomplished within 2 minutes using an Internet connection, and 5-10 minutes using a 28.8 modem connection. The network test system will: (1) provide instant score reporting to recruiters, (2) improve test security and ease test compromise concerns, (3) decrease the administrative costs at the client and server ends, (4) help reduce attrition in the training pipelines by providing new test items, and (5) provide the potential for predicting advanced phases of flight training as more cognitively complex questions (i.e., 3-D mental rotation, etc.) can be included in the ASTB.

For more information on these and other research efforts contact Doris M. Ryan, Deputy Director, External Relations, at DSN 295-0815, Commercial 301-295-0815, E-mail ryand@mail-gw.nmrdc.nnmc.navy.mil, or FAX 301-295-4033. Homepage address http://www.dmso.mil/NMRDC/.

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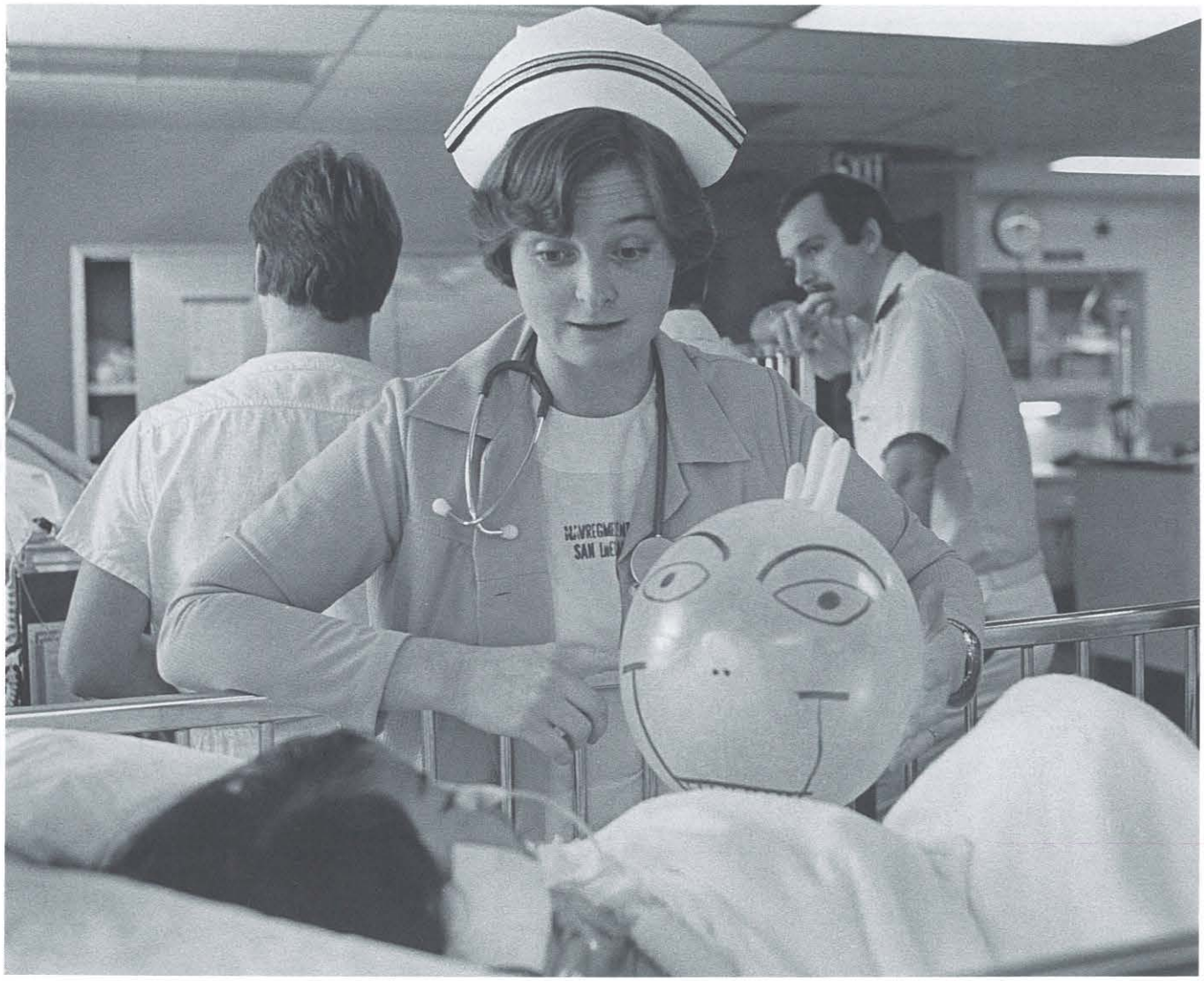

BUMED Archives

LTJG Terrie Gibbs cheers up a young patient in the surgical intensive care unit at Naval Regional Medical Center, San Diego, CA.

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